STRUCTURAL CONFIGURATION OF RAMAGIRI SCHIST BELT, EASTEREN DHARWAR CRATON: THROUGH BOUGUER GRAVITY DATA ANALYSIS

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ABSTRACT

Bouguer gravity data have been analyzed to evaluate the structural trends in parts of auriferous Ramagiri Schist belt the Eastern part of the Dharwar craton (EDC). The general geology of the study region consists of Chennai Complex (younger granites), schist belt surrounded by granitoids rocks on all sides within in the peninsular gneisses. While from qualitative analyses the geological and structural features such as six deep seated faults, three gravity highs (H1, H2 & H3) and two lows (L1 &L2) trends were delineated. Tectonic difference was elucidated on four layer earth and the depth extent and disposition of the supra crustal Ramagiri schist belt, a peninsular gneiss layer that forms the basement to the supra crustal and upper and deeper crustal layers. The sub-surface crustal configuration of the region is computed down to Moho along the eight traverses were obtained by inversion of Bouguer gravity anomalies. Subsequently, digitizing the crustal sections obtained from inversion is presented in 3.D contour images for Ramagiri schist, Peninsular gneiss, upper crustal and deeper crustal layers.

KEYWORDS: Bouguer Gravity, Structural configuration, inversion, Dharwar craton, trident shape.

1.1 Introduction and Geology:
The eastern group of green stone belts in the Dharwar craton is interesting both from the geological, geophysical as well as the economic significance of the Ramagiri schist belt of the craton stems from the fact that it's a auriferous (gold bearing) eastern schist belt of the Dharwar craton occurring in Karnataka and Andhra Pradesh states. In this chapter the Bouguer gravity data over the Ramagiri schist belt is carried out at different levels (Keshawamani et al.1996) are utilized and further processed by qualitative and quantitatively to develop plausible subsurface structural configuration of the Ramagiri schist belt.

The Ramagiri is situated about 170 km north of Bangalore and 30 km west of Dharmavaram in the Andhra Pradesh State. The north-south trending Ramagiri schist belt is trident shaped, 2-4 km wide and extends discontinuously for 80 km (Fig.1.1). It consists of three arms of metavolcanic rocks, eastern, central and western arms that spread out northward, dominated by amphibolites, pillowed metabasalts, intensely folded greenstones, sheared meta-gabbro, phyllites chlorite schist's, mafic and felsic rocks and ferruginous quartzite's. Details of lithology Balakrishnan *et al.* (1999) and Mishra, et al.,(2000) structure, geochemistry, geochronology and petrogenesis are given in Krishnarnurthy (2014), Ghosh *el al.* (1971), Zachariah (1995), Zachariah et al., (1996).

The Ramagiri schist belt is surrounded by granitoid rocks on all sides. Granitoid rocks referred to as the gangam complex crop out on the western part of the Ramagiri schist belt and the chenna gneisses to the east of the belt. The Ramagiri Complex separates the central and western arms of the schist belt. The chenna gneisses are well foliated granidoritic and at places migmatized.

Monzodiorite predominates in the Gangam complex and the Ramagiri complex consists of quartz-diorite, granodiorite and granite in the decreasing order of abundance. There are two parallel schist belts on either side of Ramagiri with a granite pluton in between Balakrishnan ***et** al.* (1999) suggested that the schist belt, consisting of highly sheared rocks, could represent a terrain boundary between the three disparate granitoid terrenes juxtaposed after 2516 and before 2468 Ma.

1.2 Gravity Data Analysis:
The color shaded Bouguer gravity map of the study area lies in between 13°55' N to 14°35' N latitude and 77°18' E to 77°46' E longitude is shown in the (Figure.1.2) are digitizing gravity data by published data (Keshawamani et al., 1999) for present analysis is presented with a 1 mGal contour interval in Figure 1.2. An area about 2700 sq.km with an average station density of 2.5 sq km covering the Ramagiri-Penukonda greenstone belt and adjoining granitic country in parts of Anathapur district, Andhra Pradesh and Tumkur district, Karnataka. From (Fig.1.2) it is evident that the Bouguer gravity map, in general brought out gravity three high zones corresponding to schistose formations and/or basic intrusive and the intervening low zones indicating granites, as there exists a density contrast of 0.25gm/c between these two formations.

It is evident that the Bouguer gravity map indicated by steep gradient from Gudibond south forming the eastern margin of the high zone at Hindupur. From the Bouguer gravity contour map, an overall relief of 24 mGals with values ranging from -92 to -68 mGals, three parallel gravity high zones highs (H1), (H2) and (H3) trends are identified, H1 is starting from south of Pedamanturu its passing near to Timmapuram and Birangapur and it is trending SE-NE direction with folding contour, another gravity High (H2) is passing through the Bokasampalli to Ramagiri and it is trending south to north direction and H3 is small extending runs between Roddam and Boksampalli and it is trending NW - NE direction.

The western branch is brought out as steep gradient from Ramagiri to north of Atmakuru and then appears to merge with the eastern margin of gravity high zone of Sandur schist belt up to south of Vidapanakallu. The other branch extending in northerly direction is also brought out as gravity high zone, in the form of a high nosing superposed over a gravity low indicating the schistose and enclaves, from east, the lows are extending of negative anomaly. The lows are extending of negative anomaly is not limited to any geological formation but is predominant over granite gneisses and schist as well but the gravity low probably a result of several granites batholiths expose in this region L1 prominent at Gonipeta in SW to NW trending near Dharwar craton part (-88 mGal to -92 mGal), L2 is small extending pronounce gravity low of -88 mGal at near Kanamnapalli extending in the direction of NW. The gravity lows might be explaining thickness of the crust or moho due to isostatic compensation.

Further, besides the intervening gravity lows zones between the schist belts two prominent feeble gravity low zones in an arcuate shape are indicated, one around Chigicherla and the other near Kanaganapalle. These zones assume importance in relation to occurrence of Kimberlite pipes.

1.3 Radial Power Spectrum Analysis:
Log Normalized radial averaged Power spectrum for the entire area has been computed for the gravity data to estimate the ensemble average depth to the different gravity horizons. Analysis of the power spectrum has indicated one well defined straight line segment, one in the low frequency range and the other in high frequency range. The average depth calculated from the straight line segment is 4.0 km is inferred as depth of Ramagiri schist belt (Fig.1.3).

1.3.1 Low pass filtered Map:
After studying the amplitude spectrum, a cut off wave number (0.024cycles/sec) was chosen to prepare the low-pass filtered map. The filtered gridded data was contoured at an interval of 2 mGal shown in Figure.(1.5) resolves the gravity high zones into a number of parallel bands represented by the disposition of the schistose formations. Feeble gravity lows within the gravity highs, possibly, represent granite diapers at depth. Some of the Bouguer anomalies do not appear to have been caused by surface geology. The iso anomaly lines generally follow a N-S trend is in accordance with general geologic lineament pattern of study area.

The qualitative analysis of the low pass filtered map, which is generally used to study the deep seated regional tectonic characteristic of the basement, has brought out the following features. A comparison of the low pass filtered map with the Bouguer gravity map reveals that almost all the features present in the original map are retained. A good correlation of the features of the Bouguer gravity map and the low pass filtered map, suggest that the causative sources of the features are either deep seated and /or broad in nature. The portions of steep gravity gradient marked as in Figure (1.4) indicate the presence of deep seated faults/contacts. These faults appear to constitute the major geological boundaries in the region.

1.3.2 High pass filtered Map:

The high pass filtering was applied to the Bouguer gravity data, resulting in suppression of wave numbers less than 0.024 cycles/sec. As expected, the high frequency component which might represent the noise, though, it is evident that three parallel high and low trends trending from south the north in the north south direction (Fig.1.5).

1.4 Gradient Analysis:

1.4.1 Horizontal and Vertical Gradient:

The Bouguer gravity data were completed Horizontal derivative (HDR), Vertical derivative (VDR), Tilt derivative (TDR) and Analytical derivatives using the equations (Nabhigian,1972) and contoured. As already mentioned, the horizontal (X&Y) shown in figure (1.6.a &1.6.b) and vertical (Z) showing in figure (1.7) gradients are measures of the rate of change of anomaly field in these directions and help in establishing geologic contacts. Thus, the geological heterogeneity and complexity of the region can be inferred from the several highs and lows in the gradient maps.

Thus the horizontal gradients along the (Fig.1.6.a) X- directions represent the rate of change of the gravity field in the corresponding directions. However in the study area large trends in the North–West and South-East directions so the horizontal gradient maps are indicative of subtle signatures defining local extent of sub-bodies and trends that can be used subjectively along with the Bouguer anomaly map (High Pass Filter) for qualitative interpretation.

1.4.2 Vertical Derivative:

Vertical derivatives are a measure of the difference in gravity value at a point relative to its values at neighboring point. The Z-gradient is thus a measured of the change in the gravity field with depth. Derivative maps are based on the concept that the rate of change of gravity with elevation is much more sensitive to changes in rock densities near the ground surface than at depth. Therefore such maps are a useful technique for demarcation of geological boundaries details of which are observed in the original map.

The vertical gradient map Figure. (1.7) seen in conjunction with horizontal gradient maps gives both the trends as well as boundaries of different rock formations in the study region.

1.4.3 Tilt Derivative:

In general, the tilt derivative enhances the high frequencies relative to low frequencies and eliminates the long wave length regional component and effectively resolves the adjacent anomalies. The tilt derivative overcomes this problem by dealing with the ratio of the vertical derivative to the horizontal derivative. The tilt derivative will be relatively insensitive to the depth of the source and has the ability to resolve shallow and deep features equally well. Figure.(1.8) is a plot of the tilt derivative of the Ramagiri Bouguer gravity map, which essentially provides an idea of the division of the gravity anomalies into different domains based on the nature, trends in the north south direction. Also, it produces positive and zero values over as well as edge of the source region respectively, where as negative values outside the source region.

1.4.4 Analytical Derivative:

The analytical signal (Figure.1.9) gives finer resolution of anomaly trends and locations and dispositions of causative (Ramadass et .al., 1990). Being the square root of the (Nabhigain, 1972) sum of squares of the horizontal (X and Y) and vertical derivatives of the anomalous field (Nabhigain, 1972), it encompasses information of the gravity field variation along the orthogonal axes completely defining it. Structural features and boundaries of causative sources can be determined more accurately.

From the analytical signal (Fig.1.9) of Bouguer gravity in the Ramagiri region, five clusters are observed, among these three lows and two highs clusters are observed. From the geology of the area it is evident that the lows and high are representing granites and schist belts respectively.

Qualitative analysis of Bouguer gravity and analytical techniques (Horizontal derivative, Vertical derivative, Tilt derivative and analytical signal) maps were attempted to infer the structural configuration (Fig.1.10). The prominent N-S gravity linear features inferred between Krishnapuram to Srirangapur suggest deep seated fault F1 is continuous up to Srirangapur. Three other parallel faults F2 (Boksampalli – Equapalli to further north), F3 (Somandepalli to Penukonda-Cherlapalli) and F4 (Talamarla to Dharmavaram), trending in mainly N-S (NW-SE) direction were identified (Fig.1.8) from the Tilt derivative and first vertical derivative maps.

Three gravity highs H1 (trending N-S near Peddamanturu –Roddam to Timmapuram), H2 (trending N-S, Boksampalli-Mushtikovila to Cherlapalli) and H3 (trending N-S extremely eastern boundary trending from Talamarla to further north), all these highs are lying over the three parallel schist belt.

Three low trends L1 (trending N-S from West of Boksampalli – Equvapalli north), L2 (running N-S, West of Gonipet to Nagasamudram) and L3 (running N-S from West of Ramagiri tofurther north). While the highs can be attributed to schist belt axis and, the lows can be attributed to variations in the peninsular gneissic complex the schist bet list not a single massive occurrence, rather it is dispersed and shows varying trends NW-SE.

1.5 Quantitative Analysis:

The objective of quantitative analysis of the gravity data in the Ramagiri schist belt area was to understand the subsurface configuration of the area from the inversion of 8 East-West profiles parallel to 13°55' N to 14°35'N profile interval of every half degree of the length of ~80 to 85km and separated from each other by a North-South direction of 55km running from South to North digitized from the Bouguer gravity (NGRI & GSI 2006) image Fig (1.11).

The software used for inversion is the GM-SYS (2010), a gravity modeling software of geo- soft. This software is based on the methods of Talwani et al (1959), Talwani and Heirtzler (1964), and makes use of the algorithms described in Won and Bevis (1987). The software assumes a two dimensional flat earth model and uses the USGS SAKI (Webring, 1985) implementation of the marquardt inversion algorithm (Marqardt, 1963) to linearize and invert the calculation.

A 4-layer earth models was assumed for crustal configuration down to the Moho a top layer of peninsular that forms the basement to the supra-crustal (Schist 2.85 gm/cc), the upper crustal layer, and deeper crustal layer bounded at its lower end by the Moho. The corresponding densities assumed by the earlier studies (Mishra et al 2004; Bijendra Singh & Arora-2008, Sharma et al-1979), are 2.62gm/cc, 2.72gm/cc, 2.85gm/cc and 3.3gm/cc respectively were obtained from independent estimates for crustal thickness in the region.

Further GM-SYS software does not require a regional to be subtracted from the Bouguer anomaly has the entire crustal configuration down to the moho is model by means of the assumed 5-layer earth to moho is model layer was iteratively modified for best fit between observed and computed Gravity anomaly profile. The error in best fit was found to vary between 1.2 to 2 km, which is well within acceptable limits.

1.5.1 Inversion along the (Latitude-13°55'N) Profile-R1:

Profile-R1 (Figure.1.12) runs from west to east along latitude-13°55' is approximately 28km in length the crustal section along this profile is for the major part marked by gentle undulations. The topmost layer comprising gangam complex (younger granites) is exposed at surface almost along the profile where the higher density peninsular gneissic layer, is exposed to shallow depth. As compared to the deeper layers, these layers have an irregular shape. While the gangam complex (younger granitic intrusions), most evident between 0.64 to 10.6 km and Chennai gneissic exposed between 10.6 km to 28.17 km from the western to east of the profile, have a maximum thickness of 1.34 km and 1.40 km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

From the (Fig.1.7) it is evident that one dipping fault i.e F3 it is west of the Ramagiri schist belt is indicated at the 12.89 km along the traverse, which is marked by all the underline layers which were infer from qualitative analysis. The minimum and maximum values of peninsular, upper crustal and deeper crustal thicknesses are 8 km& 10 km, 19 km& 22 km and 30 km& 32 km respectively.

1.5.2 Inversion along the (Latitude-14°N) Profile- R2:

Profile-R2 (Figure.1.13) along latitude-14° is traversing from west to east approximately 48 km in length and it is separated from the profile-R1 with 55 km in North direction. The topmost layer comprising gangam complex (younger granites), Ramagiri schist and chennai complex is exposed at surface almost completely, where the higher density peninsular gneissic layer, is exposed to shallow depth. While the gangam complex (younger granitic intrusions), most evident between 0 to 25.98 km and chennai gneissic exposed between 25.98 km to 47.62 km east of the profile, have a maximum thickness of 1 km and 1.20 km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

Along the profile faults i.e. F1, F3 and F4 dipping and located at (West of the Ramagiri schist belt is indicated at the 9 km, 32 km and 47 km, which is marked by all the underline layers which were infer from qualitative analysis (Figure.1.11). The maximum and minimum values of peninsular thickness 6 km & 14 km, upper crustal a thickness 17 km & 22 km and deeper crustal thickness is 31 km & 33 km.

1.5.3 Inversion along the (Latitude-14°05'N) Profile- R3:

Profile-R3 (Figure.1.14) is parallel and separated from the profile-R2 with 55 km distance in north direction and it runs from west to east along latitude-14°05' is approximately 48 km in length the crustal section along this profile is comprising gangam complex (younger granites), Ramagiri Schist and chennai complex is exposed at surface almost completely, peninsular gneissic layer, is exposed to shallow depth. The deeper layers, layers have an irregular shape. While the gangam complex (younger granitic intrusions), Ramagiri schist most evident between 0 to 25.29 km, 25.29-30.44 km and

chennai gneissic exposed between 30.44 km to 47.56 km from the western to east of the profile, have a maximum thickness of 1.28 km, 0.97 km and 1.29 km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

Four dipping faults are mapped along the profile-R3 at i.e F1, F2, F3 and F4 (West of the Ramagiri schist belt is indicated at the 9.23 km, 28.80 km, 34.33 km and 46 km respectively. Peninsular thickness is varying from 8 km to 12 km, upper crustal a thickness is varying from 18 km to 21km and deeper crustal thickness is varying from 29 km to 30 km.

1.5.4 Inversion along the (Latitude-14°10' N):
Profile-R4: Profile-R4 (Figure.1.15) with 55km in North direction, this profile R4 runs from west to east along latitude-14°10' is approximately 48 km in length the crustal section along this profile is for the major part marked by gentle undulations. The topmost layer comprising gangam complex, Ramagiri schist and chennai complex is exposed at surface. Gangam complex, Ramagiri is situated between 0 to 23 km, 22.85 km – 31 km and chennai gneissic exposed between 31 km – 48 km from the western to east of the profile, have a maximum thickness of 0.37 km, 0.53 km and 0.72 km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10

Three dipping faults i.e F4, F3 and F2 west of the Ramagiri schist belt is indicated at the 48 km, 34 km and 48 km respectively, which is marked by all the underline layers which were infer from qualitative analysis. Peninsular thickness varying from 8 km to 14km, upper crustal a thickness is 18km to 23km and deeper crustal thickness is 30 km to 32km varying respectively.

1.5.5 Inversion along the (Latitude-14°15'N) Profile- R5:
Profile-R5 with 55km in north direction (Figure.1.16) trending from west to east along latitude-14°15' is approximately 44km in length the crustal section along this profile, gangam complex, Ramagiri schist and younger granites is exposed , where the peninsular gneissic layer is modeled with higher density. While the gangam complex (younger granitic intrusions), Ramagiri schist lies between 0 to 14 km, 20– 27 km and chennai gneissic exposed between14 km-20 km & 27 km to 48 km from the western to east of the profile, have a maximum thickness of 0.45 km, 0.41 km and 0.32 km & 1.13km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

Along the profile three dipping faults identified i.e. F4, F3 and F2 West of the Ramagiri Schist belt is indicated at the 45.75 km, 33.74 km and 18 km respectively, which is marked by all the underline layers which were infer from qualitative analysis. Varying of thicknesses from minimum to Maximum of Peninsular is 7 km & 12 km, upper crustal is 17 km & 21 km and deeper crustal is 30 km & 31 km respectively.

1.5.6 Inversion along the (Latitude-14°20' N) Profile-R6:
Profile-R6 (Figure.1.17) runs from west to east along latitude-14°20' is approximately 48 km in length and it is separated from the profile R6 with 55 km in North direction, the crustal section along this profile R6 is for the major part marked by gentle undulations. The topmost layer comprising gangam complex, Ramagiri schist and chennai complex and fallows peninsular gneisses layer, is exposed to shallow depth. While the gangam complex (younger granitic intrusions), Ramagiri most evident between 0 to 15 km, 20.51- 25.09 km and Chennai Gneissic exposed between15 – 30.51 km & 25.09 km to 48.08 km from the western to east of the profile, have a maximum thickness of 0.22 km, 0.45 km and 0.17 km & 2.31km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

Three dipping faults i.e F4, F3 (West of the Ramagiri Schist belt) and F6 is indicated at the 46.54 km, 29.06 km and 22.57 km respectively, which is marked by all the underline layers which were infer from qualitative analysis. Peninsular thickness is varying from 8 km to 12 km, upper crustal thickness is varying from 20 km to 24 km and deeper crustal thickness is varying from 32 km to 34 km.

1.5.7 Inversion along the (Latitude-14°25' N) Profile- R7:
Profile-R7 separated from the profile-R7 with 55km in North direction (Figure.1.18) it is in the direction of west to east along Latitude-14°25' is approximately 48 km in length the crustal section along this profile R7. While the gangam complex (younger granitic intrusions), Quartz, Ramagiri most evident between 0 to 14.12 km, 14.12- 22.87 km, 22.87 – 29.46 km and Chennai Gneissic exposed between 29.46 – 41.73 km from the western to east of the profile, have a maximum thickness of 1.57 km, 0.79 km, 0.69 km and 0.87 km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

Faults i.e F1, F4,F6 (West of the Ramagiri Schist belt) and F5 dipping faults are indicated at the 5.54 km, 36.12 km ,14.83 km and 44.32 km respectively and one shallow depth fault i.e F6 is indicated at 48.33 km, which is marked by all the underline layers which were infer from qualitative analysis. Peninsular thickness is minimum 7 km, maximum 10 km, upper crustal a thickness is varying from 19 km to 22 km and deeper crustal thickness is varying from 31 km to 33 km.

1.5.8 Inversion along the (Latitude-14°30' N) Profile- R8:
Profile-R8 in North direction (Figure.1.19) extending from west to east along latitude-14°30' is approximately 48 km in length the crustal section along this profile consist of younger granites is exposed at surface, while the higher density peninsular gneissic layer, is extending vertically with shallow depth. As compared to the deeper layers, these layers have an irregular shape. While the gangam complex (younger granitic intrusions), Ramagiri is located between 0 to 12.61 km, 30.34- 34.30 and chennai gneissic exposed between 12.61-30.34 km & 34.30-48.89 km from the western to east of the profile, have a maximum thickness of 0.83 km, 0.07 km and 0.11km & 0.28 km respectively, the peninsular gneissic (P.G) have a variable thickness ranging from 0 to 10 km.

One dipping fault i.e F6 and one shallow depth fault(f6) is indicated at the 11.81 km and 34.11 km respectively ,which is marked by all the underline layers which were infer from qualitative analysis. Peninsular thickness is varying between 10 km to 13 km, upper crustal a thickness is varying between 18 km to 22 km and deeper crustal thickness is varying between 29 km to 32 km.

1.6 Sub-Surface Topography of the Crustal layer:
The depth to the each of the layer basalt, sediment (where present), peninsular and the upper and deeper crustal layers (moho) along the profile in the study area is present as 3D-contour images. Younger granite Figure. (1.21.a), upper crust Figure. (1.21b), lower crust figure. (1.21c). The depth to each of the layers modeled such as Ramagiri schist belt ,younger granites, peninsular gneisses, upper crustal and deeper crustal(up to Moho) along all the traverses in the study region were digitized and as presented as a 3-D contour images.

The depth to the each of the layer i.e Gangam complex (Fig.1.20.a), Ramagiri schist(Fig.1.20.b) and Chennai complex (Fig.1.20.c), peninsular gneissic, upper crust and lower crust up to Moho along the all the profiles (T1-T8) in the study area digitized and presented as 3D-contour images (figure.1.11). As the Ramagiri schist is located at Parallel gravity highs is express at center of the study area and parallel existing.

The dimension of the Ramagiri schist occurs as inclusive in the basement being very small thickness (2.01km) and uncertain distribution are represented as limited section rather as layer. The younger gneissic (Chennai gneissic) varying in gentle with thickness of from to (2.3 km) it occurs as shallow depth (0.1 km) and sub surface topography of the upper crust and deeper crustal layer is accessional similar to those the extension of variation in longer in farmer (8 to 10 Km) and deeper crustal layer (28 to 32 km).

The lows in the SW region in both these layers corresponding to shallow occurring gneissic basement it is interesting to know that Ramagiri schist is extending with varying depths. The profusion of NW-SE trending faults in the region suggests build of stresses and subsequent and possible upwelling of magma along the fold axis.

SUMMARY AND CONCLUSION:
Bouguer gravity data analysis over the Ramagiri schist belt region in the Dharwar craton, exhbit highs over Ramagiri schist and lows over Younger granites From qualitative analysis of several faults and lineaments are identified. The Ramagiri schist belt occur in three parallel gravity high zones trending N-S, these zones are separated by gravity lows.

Three gravity highs H1 (trending N-S near Peddamanturu–Roddam to Timmapuram), H2 (trending N-S. Boksampalli-Mushtikovila to Cherlapalli) and H3 (trending N-S extremely eastern boundary trending from Talamarla to further north), all these highs are lying over the three parallel schist belt.

Three low trends L1 (trending N-S from West of Boksampalli – Equvapalli north), L2 (running N-S, West of Gonipet to Nagasamudram) and L3 (running N-S from West of Ramagiri to further north). While the highs can be attributed to schist belt axis and , the lows can be attributed dto variations in the peninsular gneissic complex The schist bet list not a single massive occurrence, rather it is dispersed and shows varying trends NW-SE.

A comparison of the low pass filtered map with the Bouguer gravity map reveals that almost all the features present in the original map are retained. A good correlation of the features of the Bouguer gravity map and the low pass filtered map, suggest that the causative sources of the features are either deep seated and /or broad in nature. The portions of steep gravity gradient marked as in Figure (7.4) indicate the presence of deep seated faults/contacts.

From the analysis of analytical techniques (Horizontal derivative, Vertical derivative, & Tilt derivative). The lineaments inferred from the prominently in SE-NW, SW-NE, N-S directions, these lineaments are presented in figure.7.

Quantitative analysis through the eight Profiles (R1 to R2) along the E-W direc-

tion are Presented here to provide insight to the deeper structural configuration of the Ramagiri schist belt. The corresponding densities assume 2.62gm/cc, 2.72gm/cc, 2.85gm/cc and 3.3gm/cc respectively were obtained from independent estimates for crustal thickness in the region.

The depth to the earth of the layer Basalt, Sediment (where present), Peninsular and the upper and deeper crustal layers (Moho) along the profile in the study area is present as 3D-contour images. Younger granite (Peninsular Gneissic) Upper Crust and Lower Crust. The depth to each of the layers modeled such as Ramgiri schist belt ,younger granites, peninsular gneisses, upper crustal and deeper crustal(up to Moho) along all the traverses in the study region were digitized and as presented as a 3-D contour images. The average depth of deeper crustal layers in the Ramagiri schist belt region i.e. Peninsular gneissic layer 6 to 14 Km, Upper Crust is 17 to 22 Km and Deeper Crustal layer is 30 to 34 Km respectively.

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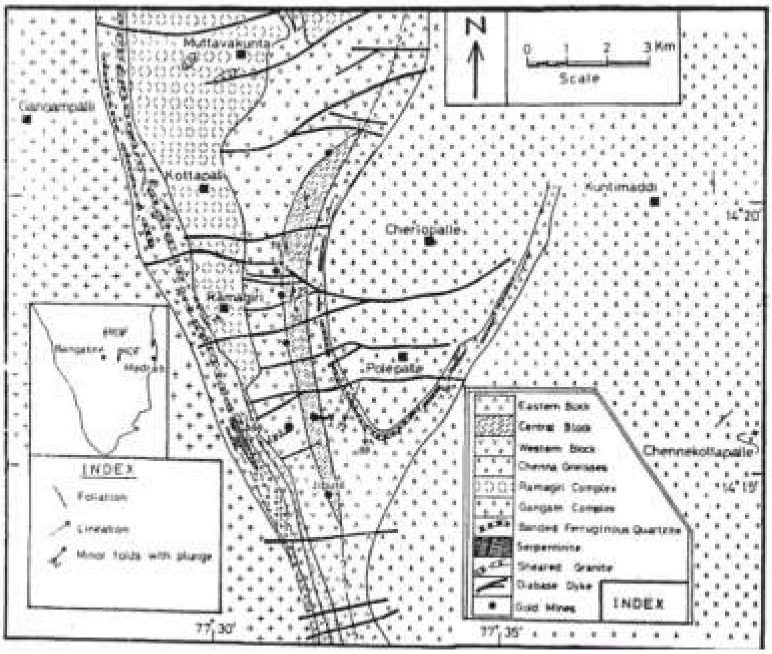

Figure.1.1: Geological map of Ramagiri schist belt showing location of drill sites (After Zacharaiah,et al., 1996)

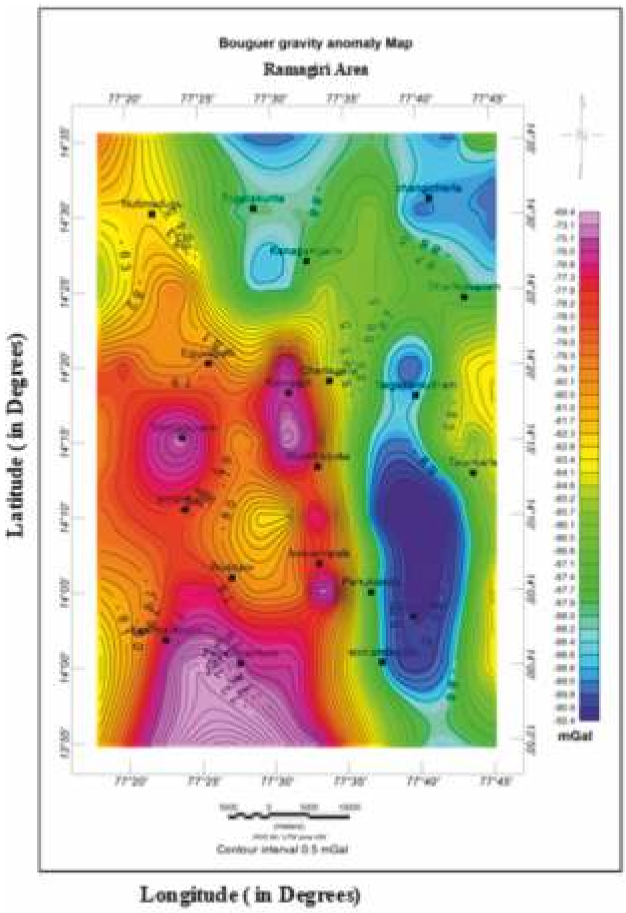

Figure.1.2: Bouguer Gravity map of Ramagiri schist region (After Keswamani et.al 1996)

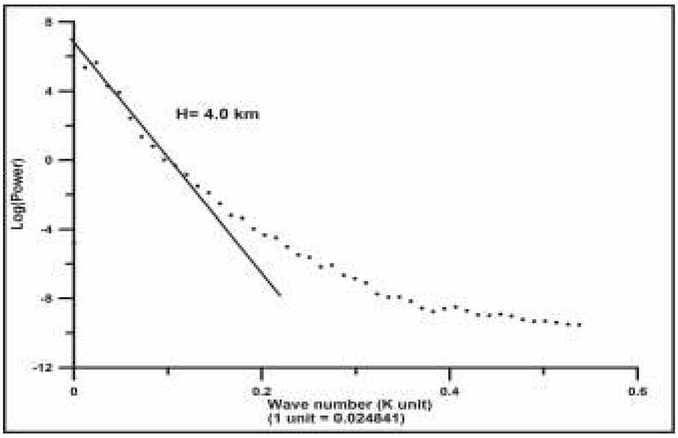

Figure.1.3: Radial power spectrum of the Bouguer gravity anomalies over the Ramagiri schist Belt region

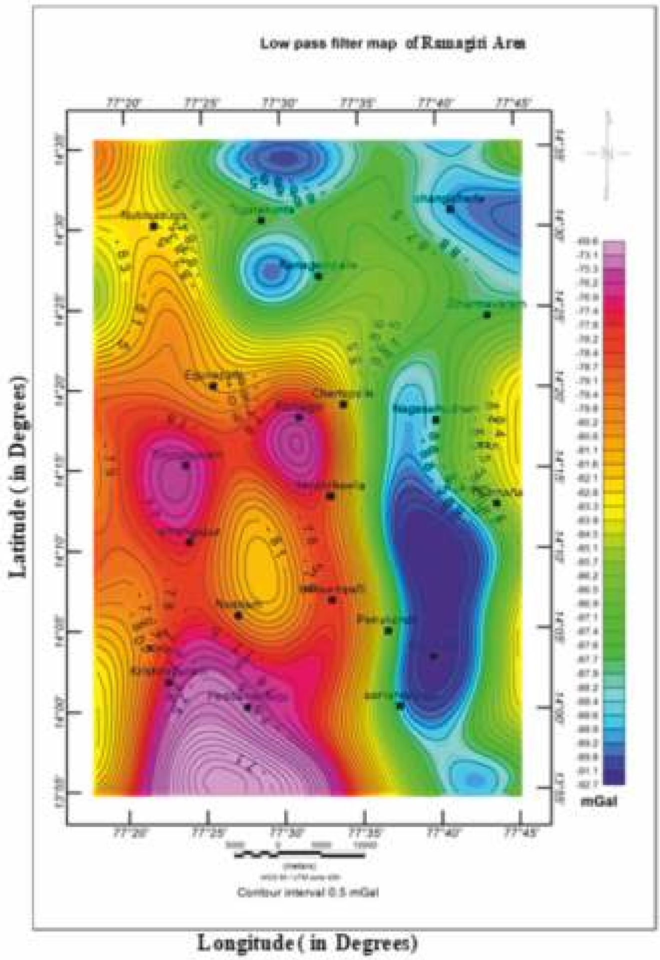

Figure.1.4: Low Pass Filtered map of the Bouguer gravity anomalies over the Ramagiri Schist Belt region

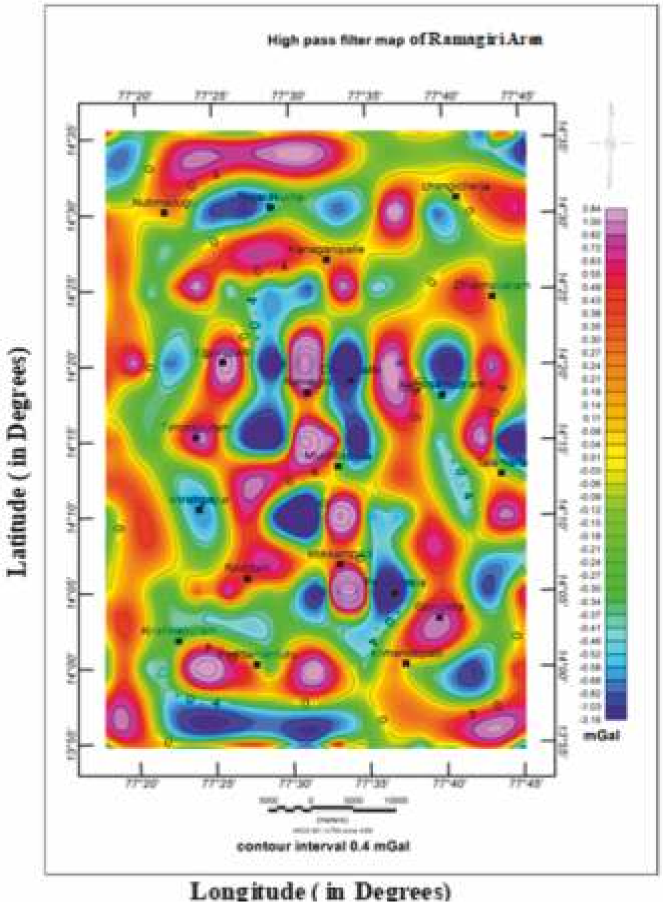

Figure.1.5: High Pass Filtered map of the Bouguer gravity anomalies Over the Ramagiri Schist Belt region

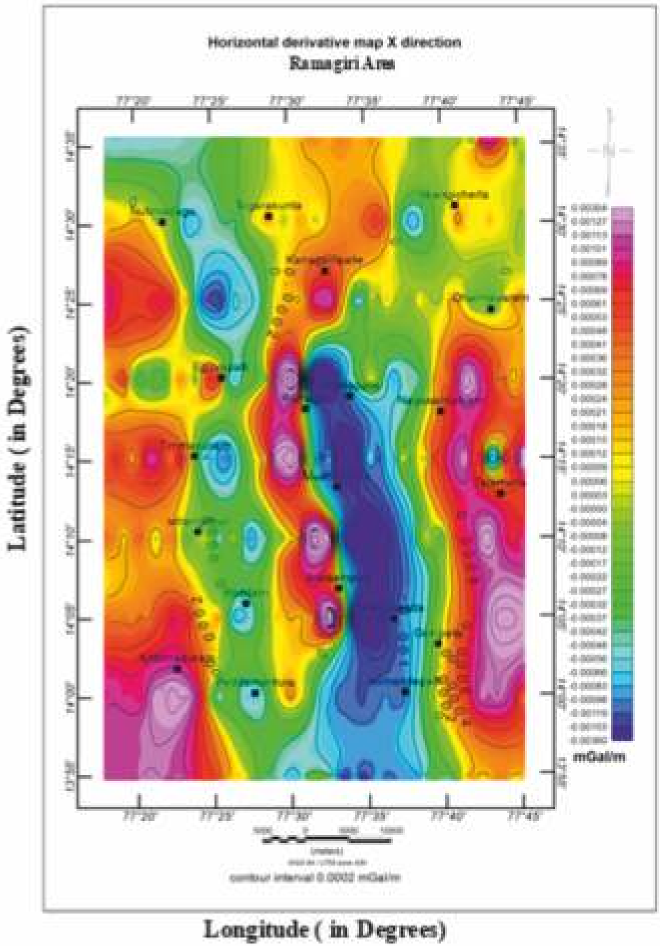

Figure.1.6.(a): Horizontal Derivative (along the –X direction) Bouguer Gravity anomalies over the Ramagiri Schist Belt region

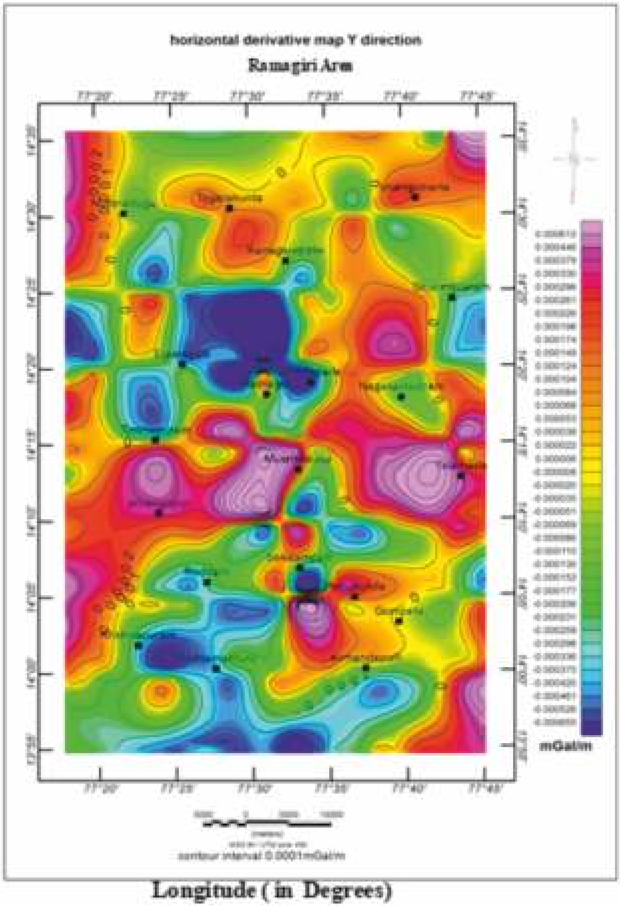

Figure.1.6.(b): Horizontal Derivative (along the –Y direction) Bouguer Gravity anomalies over the Ramagiri Schist Belt region

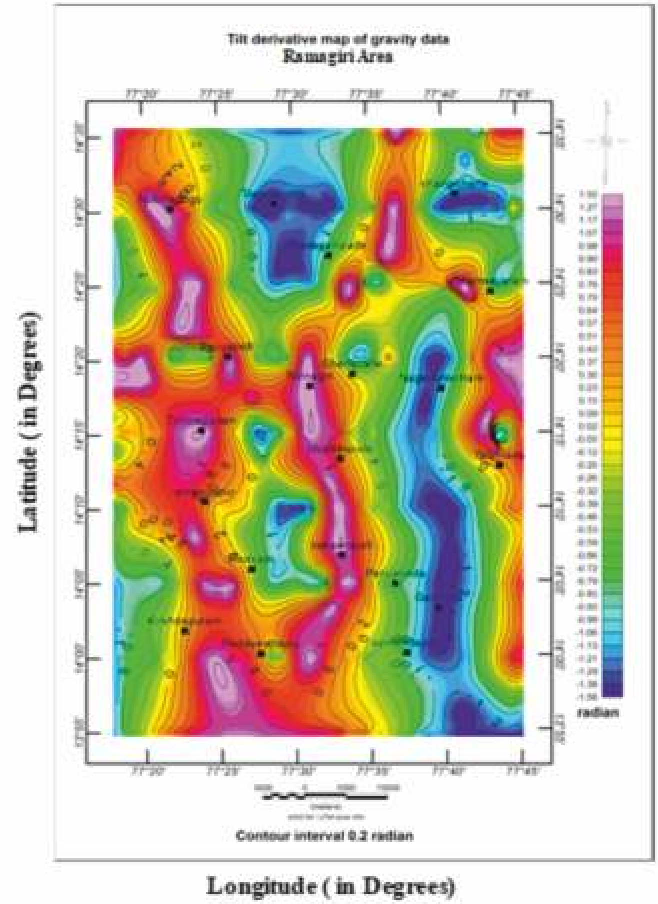

Figure.1.8: Tilt Derivative Map of the Bouguer gravity anomalies over the Ramagiri Schist Belt region

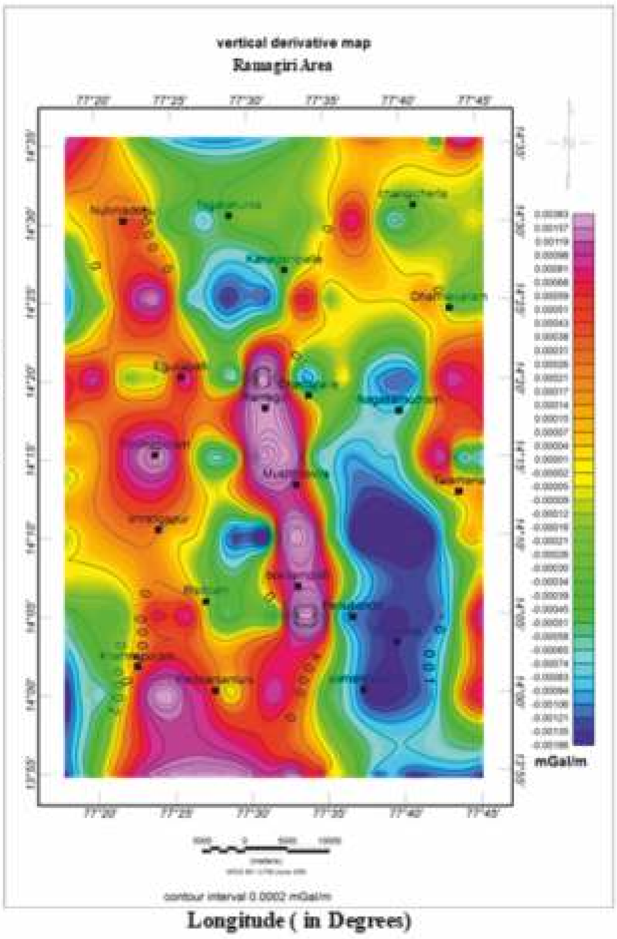

Figure.1.7: Vertical Derivative map of the Bouguer gravity anomalie over the Ramagiri Schist Belt region

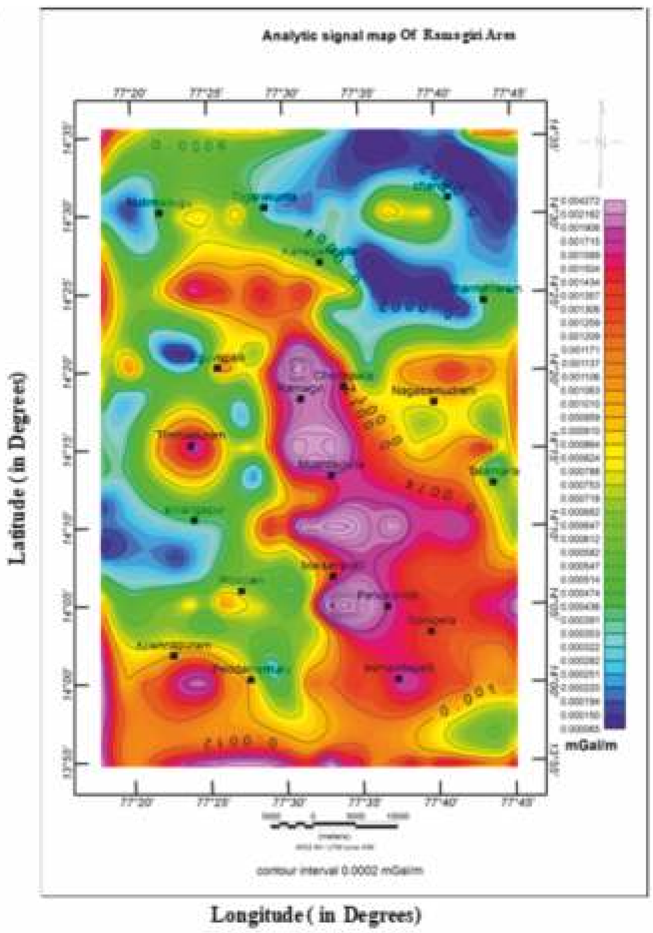

Figure.1.9: Analytical signal Map of the Bouguer gravity anomalies over the Ramagiri Schist Belt region

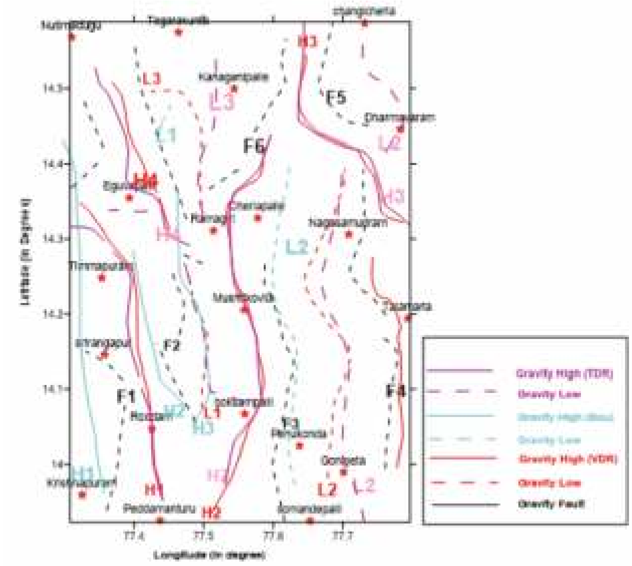

Figure.1.10: Schematic diagram showing the lineaments inferred from Bouguer anomalies and gradient techniques over the Ramagiri Schist belt region

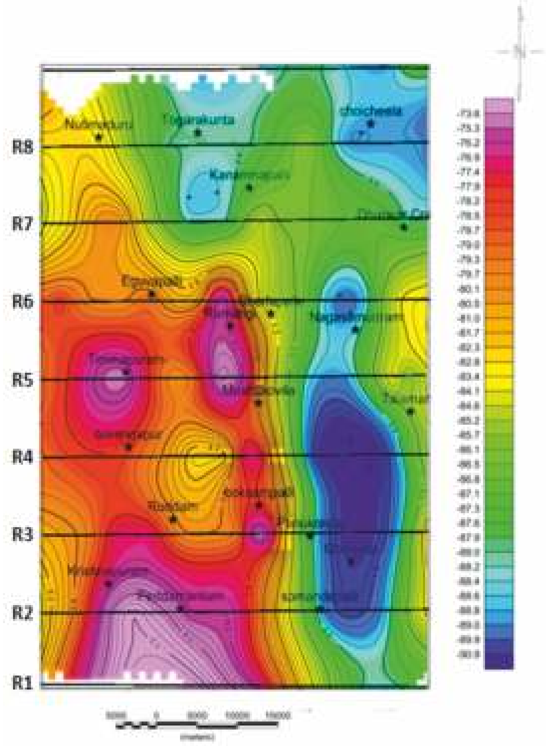

Figure: 1.11 Colour shaded contour map of the Bouguer gravity anomalies over the Ramagiri Schist belt region and profiles digitized for gravity

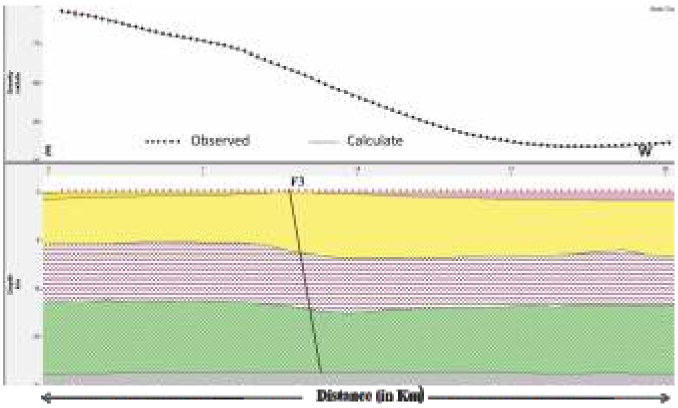

Figure.1.12: Inversion of Bouguer gravity and inferred crustal section along the Profile-R1 Ramagiri study area

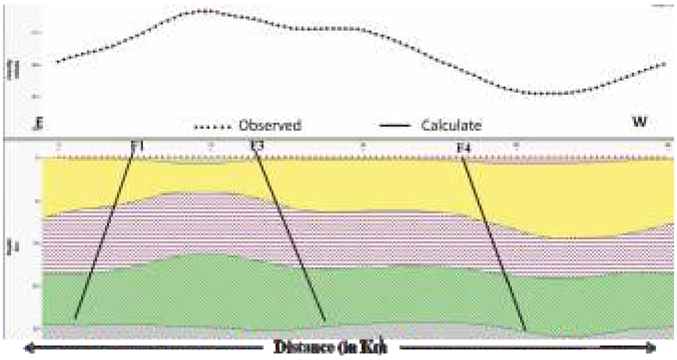

Figure.1.13: Inversion of Bouguer gravity and inferred crustal section along the Profile-R2 Ramagiri study area

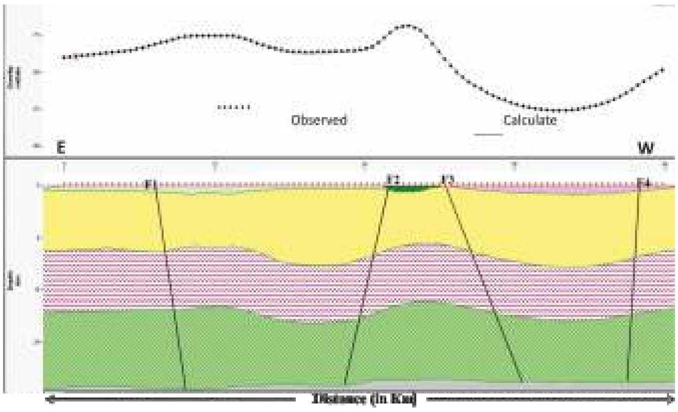

Figure.1.14 : Inversion of Bouguer gravity and inferred crustal section along the Profile –R3 Ramagiri study area

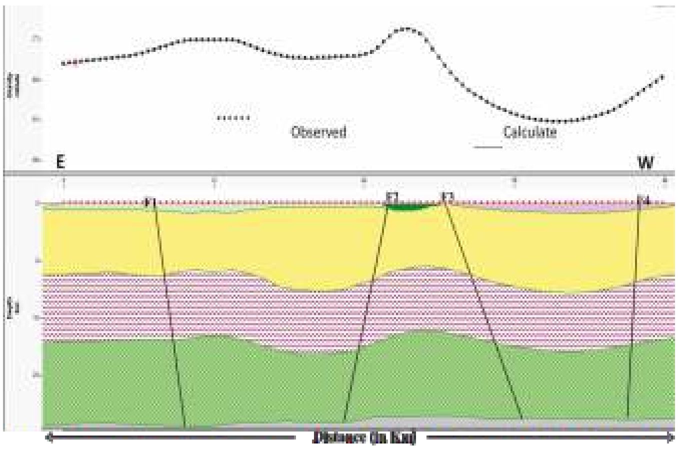

Figure. 1.15: Inversion of Bouguer gravity and inferred crustal section along the Profile –R4 Ramagiri study area

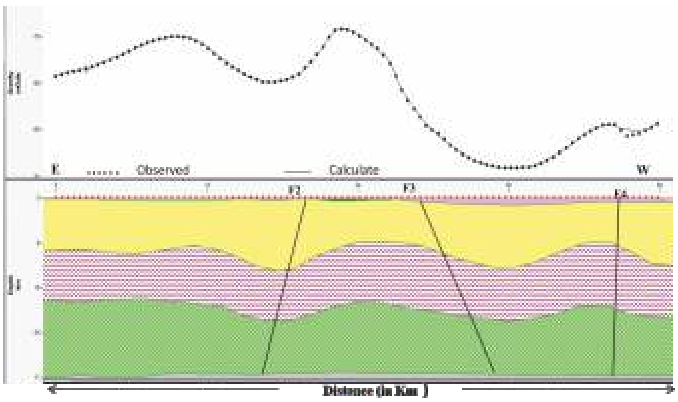

Figure. 1.16: Inversion of Bouguer gravity and inferred crustal section along the Profile –R5 Ramagiri study area

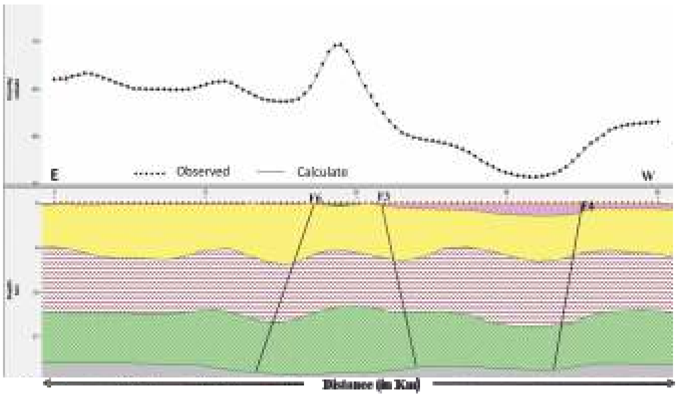

Figure.1.17: Inversion of Bouguer gravity and inferred crustal section along the Profile- R6 Ramagiri study area

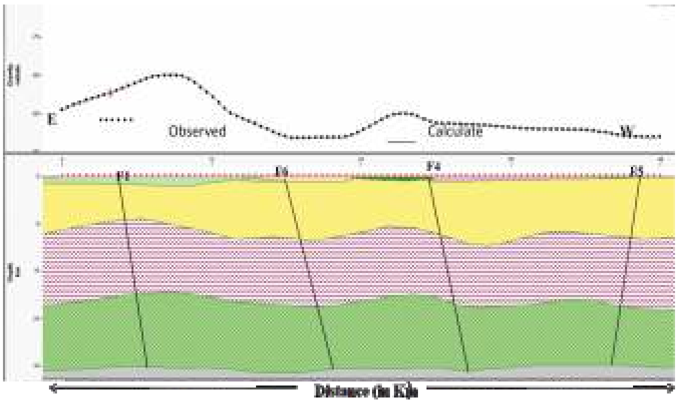

Figure. 1.18: Inversion of Bouguer gravity and inferred crustal section along the Profile-R7 Ramagiri study area

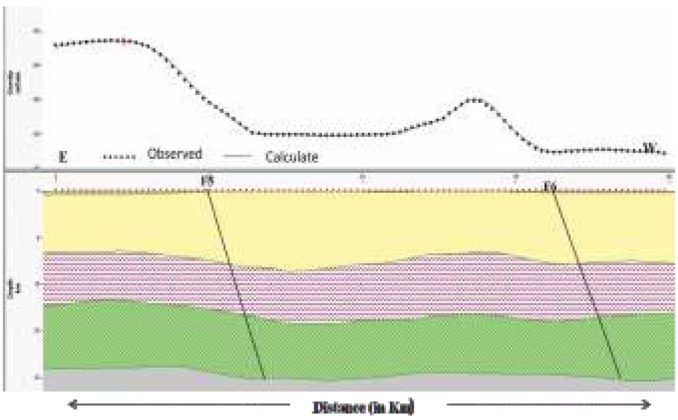

Figure.1.19: Inversion of Bouguer gravity and inferred crustal section along the Profile –R8 Ramagiri study area

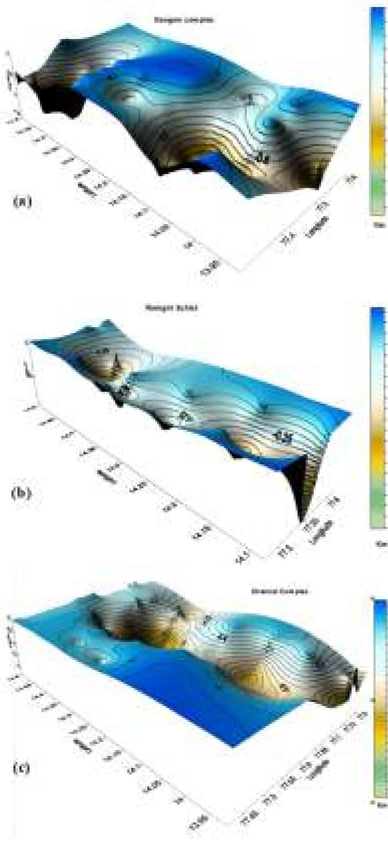

Figure.1.20: 3D View contour image of the (a) Gangam complex (b) Ramagiri schist belt and © Chennai

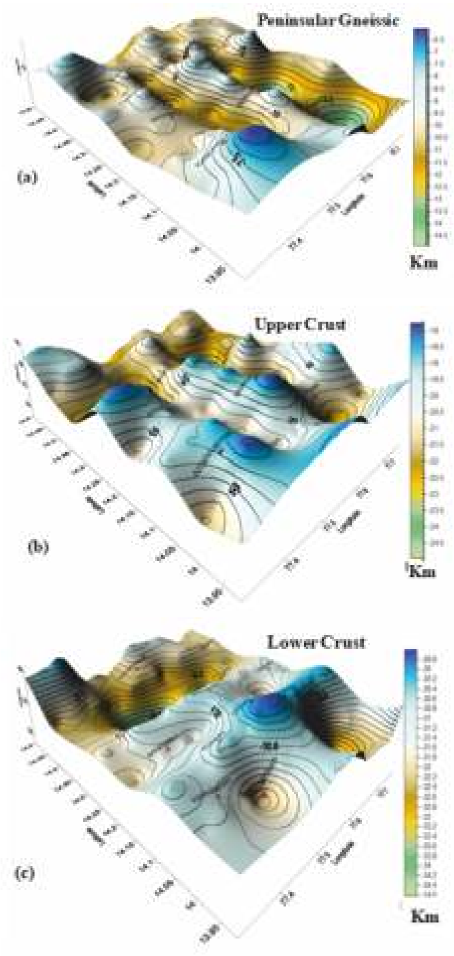

Figure.1.21: 3D View contour image of the (a) Peninsular layer (b) Upper crustal layer and (c) Deeper Crustal ayer-up to Moho

Table.1.1: Crustal configuration of the Ramagiri Schist Belt

Rock type	Parameters	R-1(13°55')	R-2(14°)	R-3(14°05')	R-4(14°10')	R-5(14°15')	R-6(14°20')	R-7(14°25')	R-8(14°30')
i) Gangam Comple	Density (gm/cc)	2.8-3							
	Width (km)	10.60	25.98	25.29	22.85	13.54	15	14.12	12.61
	Thickness (Km)	1.34	0.99	1.28	0.37	0.45	0.22	1.57	0.83
ii) Ramgiri Schist	Density(gm/cc)	2.9-3	2.9-3	2.9-3	2.9-3	2.9-3	2.9-3	2.9-3	2.9-3
	Width (km)	…………	………..	11.44	8.40	6.55	5.08	7.33	4.14
	Thickness (Km)	…………	………..	0.97	0.53	0.41	0.45	0.69	0.07
iii) Chennai complex	Density (gm/cc)	2.44-2.72	2.44-2.72	2.44-2.72	2.44-2.72	2.44-2.72	2.44-2.72	2.44-2.72	2.44-2.72
	Width(km)	17.60	13	17.12	17.53	21	13.05	12	14.59
	Thickness (Km)	1.40	1.00	1.29	0.72	1.13	2.31	0.87	0.28
Inferred Structural Features at Distasnce (km)		F3 (12.89)	F1 (9.23) F3 (46.57) F4 (32.34)	F1(9.23) F2(28.80) F3(34.33) F4(46)	F2(24.08) F3(34) F4(48)	F2(18.08) F3(33.66) F4(46.01)	F3(29.06) F4(46.54) F5(22.57)	F1(5.54) F4(14.83) F5(36.12) F6(44.32)	F5(11.81) f6(39.82)

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